



## Assessing the Impact of COVID-19 on Corporate Investment Behavior

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### Abstract

The current wave of COVID-19 outbreak has created new strategical challenges for policy officials of the industrial sector across the world. The effect of COVID-19 is more in developing economies where industrial sector is already struggling for its stability. This study introduces the impact of COVID-19 on the corporate investment behavior of non-financial publicly listed firms of Pakistan. To achieve the objective, we employ the panel data ranging from 2010 to 2020 and apply the difference-in-differences (DID) model to quantifies the empirical relationship. The outcomes of DID model suggest that the pandemic period and treatment have a significant and negative impact on corporate capital investment behavior. During pandemic spread period, the enterprises have limited their investment into fixed assets due to less productive use of such assets. Similarly, industries that exist in high-impact areas face a negative investment growth rate due to quarantine policy, fewer social movements, and high installing cost of new machinery. However, this negative effect diminishes across those firms that have a quick cash inflow rate and more availability of bank loans. These two factors serve as a financial setback against the adversities of pandemic. By drawing upon the empirical reasoning on the effect of COVID-19, this study also presents possible solutions to alienate unfavorable impacts of this pandemic. Current analysis can be considered as an early attempt towards investigating the consequences of COVID-19 on investment decisions of industrial sector.

JEL Classification: G32: G31: G40: C33

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COVID-19;  
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Pandemic Impact;  
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## 1- Introduction

It is an emerging trend of economic and finance research to find out the potential impacts of COVID-19 spread on different sectors of economies [1-3]. The spread of COVID-19 has created serious economic challenges for policy officials due to sudden occurrence. Since its first outbreak in December 2019 in Wuhan city of China, this virus spread in almost 200 countries of the world and almost 196,553,009 confirmed cases have been reported across the world. The human causality rate is 4,200,412 till the date (<https://covid19.who.int/>). These statistics are consistently increasing. In this pandemic, almost all the activities of normal life are affected as it has created the severe threat of spread by travelling and social gatherings. Additionally, other economic activities that require physical meetings have also become limited. Furthermore, quarantine measures have created tough situations for enterprises specifically for those that are directly connected with active social activities e.g., transportation, international travelling, and local consumer market [4]. Small

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business entities are also struggling for their survival while large corporation entailing severe financial problems due to remarkable decrease in economic activities. This reduction in economic activities has deteriorated the transparent functioning of stock market, commodity market, and other trade activities [5]. Although, corporate sector has disseminated a range of activities for their survival, but current situation of pandemic has caused the significant reduction in several business activities. Among the other business activities, corporate investment is an important business activity which has key role to ensure the financial stability [6]. In this study, we assess the impact of COVID-19 on corporate investment behavior.

Corporate investment behavior reflects the attitude of firms to actively indulge in new investing activities to ensure the organizational growth [7]. Some firm specific factors that determine the corporate investment behavior involve cash inflow rate, availability of bank loans, and cash holding, etc. Such determinants actively participate in decision regarding making the new investment [8]. Corporate investment behavior is a situation sensitive phenomenon that exhibits a strong attachment with social and economic condition. Apparently, the managerial decision regarding the exploration of new investment is ameliorated by any variation in the current economic or social condition [9]. Notably, current pandemic situation has changed the manager's way of thinking [10], and it has also been evidenced from research that manager's personality traits determine the different firm investment decisions [11]. Following such notions, it can argue that corporate firms may experience fluctuations in their investment pattern due to current pandemic impact.

In addition to psychological interpretation, current pandemic situation can alter the investment decision by changing the following factors: payback period, unsystematic risk, sunk cost, etc. First, as other economic sectors are suffering from slow growth due to this pandemic, the efficiency of the industrial sector may decrease due to inter-connectivity with other economic sectors. It may become more uncertain to get the maximum efficiency from industrial machinery and other equipment's that acquired to meet the production demand due to uncertainty in demand of products [6]. Therefore, the expected payback period may become longer which eventually discourage the corporate managers to make any investment. Additionally, such uncertainty regarding payback period alternatively changes the behavior of industrial managers to invest in capital assets. Similarly, pandemic spread has also created the uncertainty in business environment, and it's still unknown how long-lasting it will be. Such uncertainty ultimately enhances the risk of physical investment and makes the investment projects undesirable [12].

In current pandemic situation, three portfolios i.e., property, plant, and equipment collectively known as capital investment may face different levels of risks. The risk associated with machinery investment may higher as compared to property and equipment investment and vice versa. This situation can create high volatility regarding the return on investment, which discourages firms to invest more in such assets. As likely, as many businesses are facing financial distress and high default risk due to spread of current pandemic [10], there exists more probability of sunk cost due to which corporate managers can shift their investment decision from physical assets to other high return securities. Hence, it can be suggested that current pandemic situation has a strong association with corporate investment. In addition to industrial investment, other social activities have also shrunk due to current wave of Covid spread [13]. It can impede the corporate investment due to the high risk of investment failure. Specifically, the assessment of pandemic impacts is crucial for developing economies where business stability faces overwhelming challenges.

This study mainly focuses on impact of COVID-19 on corporate investment behavior of non-financial publicly listed companies of Pakistan. To understand the pandemic impact, industrial location was segregated into two parts i.e., high impact and low impact areas. For empirical analysis, we have employed the difference-in-differences (DID) model. The outcomes of DID model reveal that Treatment and Pandemic have significant and adverse impacts on investment behavior. Corporate firms existing in high impact areas face low investment rate due to strict quarantine policy, less social activities, and hurdles in installment of new machinery in such areas. Similarly, during pandemic spread period (2020), corporate firms experienced the declining investment rate due to uncertainty about future demand for industrial products and less productive use of fixed assets. However, as the findings imply, corporate firms operating in high spread areas can mitigate the unfavorable impacts of pandemic by accelerating the cash inflow and by acquiring more bank loans. These factors enhance the immunity of firms against unfavorable effects and reduce the financial constraints. The empirical findings enhance the understanding of the effects of COVID-19 on industrial sector decisions, specifically investment decision.

This study theoretically contributes to the existing literature and highlights the empirical impact of COVID-19 on investment decisions. Theoretically, it enriches the existing literature by adding the pandemic impact on investment behavior of corporate managers. An array of studies was found on routine determinants, but no study explores such relationship specifically in emerging economies where industrial sector struggles more for its stability. Empirically, the contribution of this study is in two folds. First, it highlights that pandemic period and regions have significant and adverse impact on investment rate. Secondly, it establishes the role of quick cash inflow and bank loans in resisting the unfavorable impacts of COVID-19. This empirical analysis can help in formulating the financial policies that can help to timely cope up with unfavorable impacts of virus spread. It also motivates the researchers to conduct more empirical studies that highlight the role of pandemic spread on other business decisions.

The remaining sections of the study are arranged as follows. Section 2 discusses the theoretical background and formulates the hypothesis, section 3 explains the material and methods, and section 4 describes the empirical findings of the study. Section 5 concludes the whole discussion and clearly describes the implication of study. References are given at the end of study.

### 1-1- COVID-19 in Pakistan

As COVID-19 has spread almost all over the world, in Pakistan the first outbreak of this virus was reported on February 26, 2020. After this, it has affected the massive population where there are almost 873,220 confirmed cases, and casualties reach the figure of 19,384 (detail in Figure 1) by the end of 2020. However, prosperity rate is a bit slower as compared to other developing countries i.e., Italy, France, and China due to strict measures taken by Government of Pakistan against this virus. In addition to other losses, Asian Development Bank (ADP) estimates the cost of this pandemic as \$4.95 billion and the cut in GDP growth rate to be 1.57%. A country that is already on its struggling stage may become more economically stagnant due to this pandemic. The different economic sectors including manufacturing, service, and financial sectors suffer from negative growth rates. Their financial impairments could be more than as estimated by analysts [14]. Almost all business operations i.e., production process and buying of raw material and selling of final products were affected during this era due to lockdown policy, which limited the movement of humans and reduced the consumption rate. This reduction in sales volume has reduced the profitability of corporate firms. The negative turnover rate shrinks the capital reserve, which eventually reduces the managerial confidence to invest in capital investment projects [15].

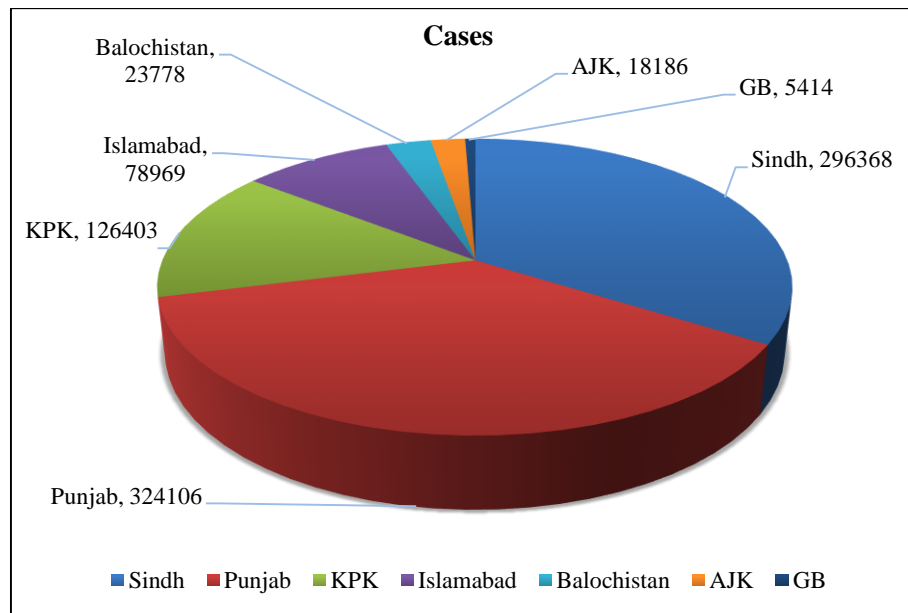


Figure 1. Province Wise COVID-19 Information.

## 2- Theoretical Framework and Hypotheses Development

Pigou (1936) [16] had made a remarkable contribution in the discussion of corporate investment decision. The main theme of his theorem is explicitly based upon the different assumptions related to investment decision i.e., new investment based upon expected return. This theory also asserted that corporate investment behavior is influenced by economic fluctuation. The first notion of this theory reflects the change in investment behavior as the expected return is highly uncertain due to widespread of pandemic. Other economic sectors were significantly affected by this virus, which can eventually deplete the turnover on any future investment. Second, pandemic has also exasperated the unfavorable effects on economic condition of Pakistan i.e., low GDP growth rate, decrease in exports, increase in import of sanitary goods, etc., which can in turn affect the investment behavior of local enterprises. The study of Farooq et al. (2021) [7] has significantly highlighted the effect of macroeconomic condition on corporate investment. The notions of other corporate investment theories i.e., Accelerator theory of investment [17], profitability theory of investment [18], financial theory of investment [19], and Tobin's Q theory of investment [20], also enhance the understanding on possible link of COVID-19 and investment behavior of firms.

The accelerator theory of investment states that futuristic investment (specifically capital investment) options are directly proportional to expected return on such investment. However, COVID-19 has explicitly made future events uncertain, as it is not yet clear how long it will last, and its effects are still undefinable. Similarly, profitability theory of investment argues that sustainable profit is necessary for making new investment as it enhances the retained earnings

that can be used as internal financing for new investment [21]. However, due to limited business operations and low demand for products, the profit margin has significantly decreased, which directly achieved the low investment level. Next, financial theory of investment assumed that investment level is affected as the cost of financing to investment may change. In current pandemic situation, default risk of companies has increased, which ultimately restricted the banks to lend the loans to industries. Moreover, COVID-19 has also affected the performance of stock market [1, 3], which can deviate the equity financing option for investment. In addition to these theories, Tobin has proposed his famous model known as Q theory, which states that new investment decision depends upon its replacement cost. He has also argued that investment decision depends upon fluctuation in capital stock issued to the finance of investment. As pandemic has created significant fluctuations in stock market proceedings [22], this model somehow guides about investment decision. Based upon these notions, it can be hypothesized that.

**H<sub>1</sub>: COVID-19 has significant and negative impact on corporate investment behaviour.**

### 3- Material and Methods

#### 3-1- Data Description

This study empirically explores the impact of COVID-19 on corporate investment behavior of non-financial publicly listed companies for the period 2010 to 2020. The empirical analysis is based upon secondary data and follows the deductive approach of research. The financial information of firm-specific variables was obtained from annual published report by The State Bank of Pakistan (SBP), while the information on COVID-19 spread across the different regions was retrieved from COVID Information Cell\* established by Government of Pakistan (GOP). According to statistics, almost 74 companies are located in high impact regions† while others are in low impact regions. We have considered the construction site location instead of the main office location for effect categorization. For sample selection, companies from financial sector (carrying SIC codes 6000 to 6999) and those with missed financial information for five or more than five years were excluded from sample to make the results unbiased. Data were arranged by winsorizing at 5% from both ends.

#### 3-2- Variables Specifications

In this study, corporate investment behavior was considered as dependent variable, which represents the annual growth rate of capital investment. It also exhibits the procurement of fixed assets during specific year as compared to previous year (ending fixed assets-opening fixed assets/opening fixed assets) [15]. The investment in fixed assets is necessary to ensure the business stability. To understand the pandemic impact, we have introduced a dummy variable named *Period* which is equal to 1 for outbreak year i.e., 2020, and 0 for the other years. Similarly, *treatment* is a dummy variable, which is 1 for the firms located in high spread COVID-19 areas i.e., Lahore, Faisalabad, and Rawalpindi, etc., and 0 for low spread region industries. Furthermore, cash inflow rate (operating cash flow + depreciation/fixed assets) and liquidity ratio (total debts/total assets) were included as independent variables. These two variables were also used as interaction terms with *period* and *treatment* to corroborate the impact of COVID-19 through firm-specific factors. Moreover, these two factors are major determinants of corporate investment as firms having more cash inflow rate invest more. Similarly, corporate firms with more availability of bank loans confident in their investment. Literature has explicitly argued cash inflow rate and liquidity ratio as determinants of investment [23, 24].

In this study, some other firm-specific variables were considered as control variables that have an important role in determining the investment behaviour. These variables are firm size (log of total assets), cash holding ratio (cash and equivalents/total assets), sales growth ratio ((current year sales-last year sales)/last year sales), and profitability ratio (net income/total assets). These determinants further outline the dependency of firm investment behaviour on other corporate level factors. The mathematical measurement of these variables was derived from previous studies arranged on the same theme [9, 25]. A brief description of these variables has been provided in Table 1.

#### 3-3- Econometric Models

Basic econometric model for testing the proposed hypothesis is as follows:

$$INV_{it} = \beta_0 + \beta_1 Period_{it} + \beta_2 Treated_{it} + \beta_3 Period_{it} * Treated_{it} + \beta_4 CIF_{it} + \beta_5 LR_{it} + \beta_6 FS_{it} + \beta_7 COH_{it} + \beta_8 SGR_{it} + \beta_9 ROA_{it} + \varepsilon_{it} \quad (1)$$

To assess the impact of COVID-19 through CIF and LR for year 2020 on investment, basic model can be modified to be as follows:

\* <https://covid.gov.pk/>

† A region with 5000 or more than 5000 covid-19 cases was categorized as high impact region.

$$INV_{it} = \beta_0 + \beta_1 Period_{it} + \beta_2 Treated_{it} + \beta_3 Period * CIF_{it} + \beta_4 Period * LR_{it} + \beta_5 CIF_{it} + \beta_6 LR_{it} + \beta_7 FS_{it} + \beta_8 COH_{it} + \beta_9 SGR_{it} + \beta_{10} ROA_{it} + \epsilon_{it} \tag{2}$$

For Treatment:

$$INV_{it} = \beta_0 + \beta_1 Period_{it} + \beta_2 Treated_{it} + \beta_3 Treated * CIF_{it} + \beta_4 Treated * LR_{it} + \beta_5 CIF_{it} + \beta_6 LR_{it} + \beta_7 FS_{it} + \beta_8 COH_{it} + \beta_9 SGR_{it} + \beta_{10} ROA_{it} + \epsilon_{it} \tag{3}$$

**Table 1. Variables Details.**

Sr no.	Variable	Description
1	INV	Corporate investment rate measure as annual increment in fixed assets
2	Period	Dummy variable which is 1 for the period of pandemic and 0 otherwise
3	Treatment	Dummy variable 1 for high impact regions and 0 for low impact regions
4	CIF	Cash inflow rate
5	LR	Liquidity or bank loan ratio
6	FS	Firm size interprets the natural log of volume of total assets
7	COH	Cash reserve ratio
8	ROA	Profitability ratio measures as net income to total assets
9	SGR	Sale growth ratio calculated as (current year sales-last year sales)/last year sale

**Note:** This table shows the brief description of variables used in regression equations.

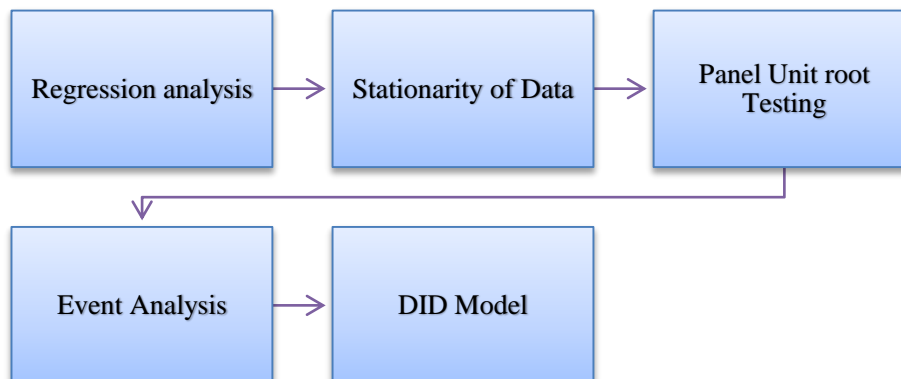
### 3-4- Methodology Discussion

For regression estimation, an econometric technique named DID model was employed. The DID or DD model is a statistical technique utilized to conduct quantitative and observational research in the subject of social sciences [2]. Basically, this method attempts to analyse the “Treatment” and “Period” effect of explanatory variables on dependent variable by aggregating the average change in control group. More specifically, DID model helps to understand the periodic change in outcome variable caused by predictor variables. It helps to understand the sudden exogenous change in predictor variable and proposes the estimated future outcomes of specific event, which may create the variation in established policy. However, sometimes DID model may be subject to some biases i.e., reverse causality, omitted variable effect, and mean regression. This econometric technique has been repeatedly used in recent studies on the theme of COVID-19 impact on firm level decisions [2, 4, 26]. In addition to DID model, we have also applied the Unit Root Test to check the stationarity of variables (results are shown in Table 2). All the variables possessed the stationarity at level 0.05. Figure 2 depicts the flow of methodology.

**Table 2. Unit Root Test.**

Method	Statistics	Prob.
Im, Pesaran and Shin W-stat	-15.106	0.000***
ADF - Fisher Chi-square	621.593	0.000***
PP - Fisher Chi-square	728.631	0.000***

**Note:** All tests have significant values less than 0.05 ( $P < 0.05$ ) signifies the stationarity at level.



**Figure 2. Methodology Flow Chart**

## 4- Results and Discussion

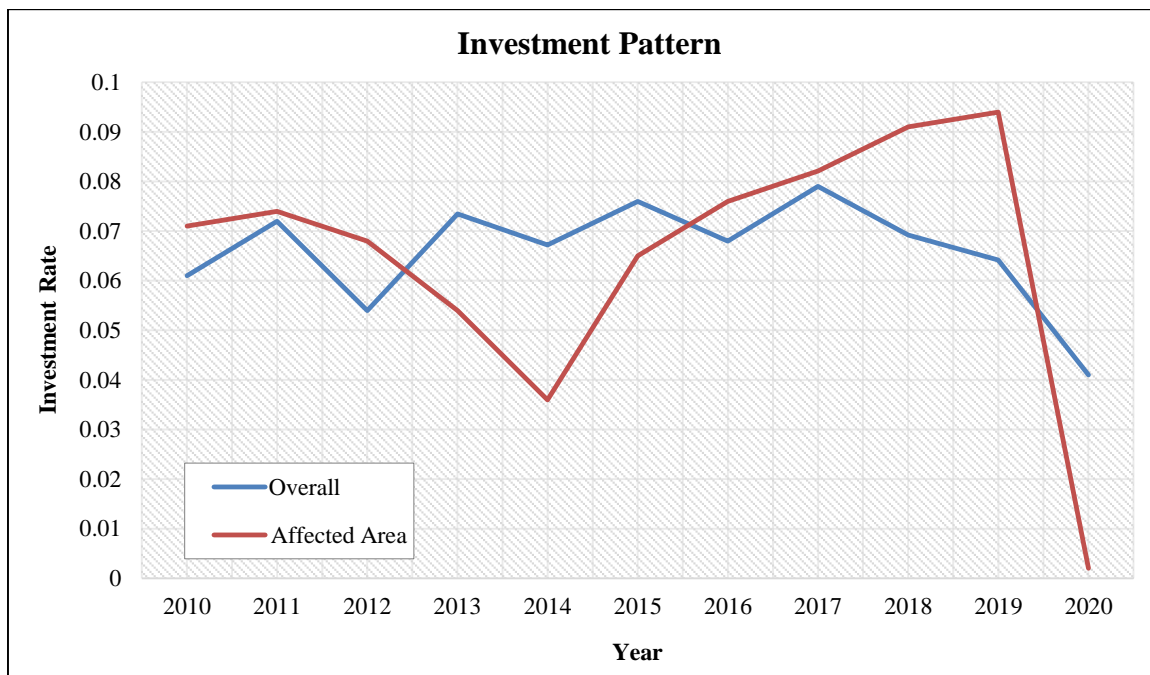
### 4-1- Descriptive Analysis

Table 3 describes the descriptive analysis of variables. The mean value of investment rate (INV) is 0.015 while the median value is -0.023, indicating the declining trend of corporate investment rate. However, average value shows the normal increment rate in capital investment. Standard deviation is 0.913, which indicates the dispersion of responses from mean value. The skewness and kurtosis are 0.220 and 3.069 relatively, which reveal the data pattern; and the number of observations is 1112, which represents the frequency of observation for regression estimation. Next, cash inflow rate (CIF) and bank loans ratio (LR) have average values of 0.183 and 0.346 relatively. These values show the percentage of cash inflow from operations and loans acquiring ratio to finance the assets. The negative average value of cash holding (-0.003) predicts that companies reserve less cash to meet the current liabilities. Similarly, average value of sales growth ratio (0.031) indicates the average increment in sales of enterprise, and the mean value of ROA (0.089) shows the efficiency of firms to earn profit by utilizing the assets. These values provide sketch about the overall trend of variables.

**Table 3. Descriptive Analysis.**

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis	Observations
INV	0.015	-0.023	0.913	0.220	3.069	1112
CIF	0.183	0.155	0.227	0.131	3.745	1112
LR	0.346	0.339	0.174	0.221	2.544	1112
FS	1.941	1.844	0.061	0.223	2.794	1112
COH	-0.003	0.002	0.069	-0.042	3.384	1112
SGR	0.031	0.022	0.222	0.325	4.789	1112
ROA	0.089	0.088	0.106	0.415	3.144	1112

**Note:** The present table reports the summary statistics of variables. **Abbreviations:** INV= investment rate, CIF=cash inflow rate, LR=liquidity ratio, FS=firm size, COH= cash holding, SGR= sales growth ratio, ROA= return on assets



**Figure 3. Average Investment Pattern.**

Figure 3 shows the overall investment comparison of all companies from 2010 to 2020. As shown in figure, red line posits the more declining behaviour for high impact region companies while blue line manifests the overall investment trend of sampled companies. These two lines prescribe that sensitivity of high affected area firms regarding the investment behaviour is higher as compared to other firms. Moreover, Figure 4 exemplifies the pandemic spread across the different regions of Pakistan.



Figure 4. General Map Location of Pakistan.

4-2- Correlation Analysis

In Table 4, correlation results among the variables of study have been presented. According to these statistics, investment rate (INV) has positive correlation with CIF (0.143), LR (0.002), FS (0.081), SGR (0.173), and ROA (0.057). These statistics show the positive contribution of variables in determining corporate firms. However, holding more cash can create the opportunity cost for investment and thus has negative correlation value as -0.070. Similarly, period and treatment have negative correlation values as -0.009 and -0.076. During COVID-19 outbreak year i.e., 2020, corporate firms face low investment rates due to increment in systematic risk (beta) of investment. However, this affect is comparatively lower than treatment, which stratifies that corporate firms from high impact areas face more distress in terms of investment behaviour. Accordingly, other firm specific factors i.e., CIF, LR, FS, COH, SGR, and ROA have specific correlation behaviour as per their correlation statistics.

Table 4. Correlation Analysis.

	INV	CIF	LR	FS	COH	SGR	ROA	Period	Treatment
INV	1.000								
CIF	0.143	1.000							
LR	0.002	-0.394	1.000						
FS	0.081	0.160	-0.058	1.000					
COH	-0.070	0.049	-0.095	-0.026	1.000				
SGR	0.173	0.236	-0.013	0.006	0.042	1.000			
ROA	0.057	0.763	-0.292	0.168	0.080	0.276	1.000		
Period	-0.009	0.002	-0.0001	-0.007	0.002	-0.010	-0.005	1.000	
Treatment	-0.076	0.012	-0.104	0.145	0.010	-0.019	-0.001	-0.0005	1.000

Note: This table depicts the statistics in terms of correlation among variables. Abbreviations: INV= investment rate, CIF=cash inflow rate, LR=liquidity ratio, FS=firm size, COH= cash holding, SGR= sales growth ratio, ROA= return on assets

#### 4-3- Regression Analysis

This study primarily focuses on impact of COVID-19 on corporate investment behaviour. We estimate this impact by employing the DID model and presenting the results in Table 5. According to statistics, period has a significant and negative impact on corporate investment behaviour. Irrespective of steps taken by the Government of Pakistan against the spread of virus and to sustain the growth of industrial sector [14], but it is evident from statistics that productive use of fixed assets (PPE) has diminished due to less demand for industrial products. This factor eventually discourages firms to make an active investment in fixed assets. Moreover, the empirical study performed by Himanshu, et al. [27] illustrated adverse effect of covid-19 on decisions related to investment portfolio, which is much likely as industrial capital investment decisions. They have indicated the investor's behaviour regarding investment decisions and vowed that investor follow the pessimistic investment options during the spread of pandemic due to less return on investment.

**Table 5. COVID-19 Impact on Corporate Investment.**

Variables	Coefficient	T-statics	Probability
C	-0.048**	-1.789	0.073
Period	-0.009***	-2.297	0.002
Treatment	-0.036***	-2.728	0.006
Period*Treatment	-0.005***	-4.451	0.000
CIF	0.215***	5.118	0.000
LR	0.046	1.256	0.209
ROA	-0.320***	-3.679	0.000
SGR	0.147***	5.414	0.000
FS	0.029***	2.770	0.005
COH	-0.200***	-2.356	0.018
<b>Adjusted R-square</b>		0.064	
<b>Prob. of F-stat</b>		0.000	

**Note:** \*\*\* Significant at 1 %; \*\* significant at 5 %; \* significant at 10 % level **Abbreviations:** INV= investment rate, CIF=cash inflow rate, LR=liquidity ratio, FS=firm size, COH= cash holding, SGR= sales growth ratio, ROA= return on asset

Similarly, corporate firms that exist in high impacts areas bear a low investment rate. The negative and significant t-value of *Treatment* (-2.728) suggests that different factors i.e., isolation policy in these areas, and high fixing cost of plant and machinery discourage the managers to acquire more fixed assets and eventually decrease the investment behaviour. For instance, a seminal work conducted by Talwar, et al. [28] has highlighted the impact of COVID-19 on retailing activity in high impact areas. They have observed the declining trend in trading activity of retail customers during pandemic spread. This declining trend in demand of retail customers has negative spill over impact on investment decisions of industrial sector [29]. Due to reduction in consumer goods, industrial sector is restricted to produce less products, less utilization of industrial machinery and thus less new investment in such projects occur. Further, significant t-value of *period\*treatment* (-4.451) reflects the dominant effect of both *period* and *treatment* in determining the corporate investment behaviour.

In this analysis, cash inflow rate and liquidity ratio use as explanatory variables. CIF (Cash Inflow rate) has positive and significant t-stat value of 5.118 with investment rate. The high cash inflow allows the firms to invest confidently in their fixed assets due to more availability of internal funds and high financial reserve. It also reduces the payback period, which further stimulates the investment confidence and allows the firms to avail themselves of more investment opportunities [21]. However, as the statistics reveal, LR (liquidity ratio) has insignificant association with investment behaviour. In addition to these, ROA, SGR, FS, and COH were included as control variables. The t-values of ROA (-3.679) and COH (-2.356) indicate the significance of these variables in determining the enterprise investment behaviour. However, negative co-efficient sign of ROA depicts that more profitable firms invest less in fixed asset due to conservative investment options and slow return on such type of investment. More profitable firms interested in those types of investments that have quick recovery and return period [7]. Similarly, holding the more cash can limit the new investment ventures prevailing the fewer funds to invest. Whilst other control variables i.e., SGR and FS have significant and positive t-values as 5.414 and 2.770 relatively. Due to constant growth in sales, corporate firms need to install more *property, plant, and equipment* collectively known as capital investment to meet the increasing demand for sale. Moreover, high sales growth rate boosts the cash inflow which directly encourages the investment behaviour of managers. Meanwhile, larger firms invest more in acquiring capital assets to ensure sustainable growth [8, 21].



In brief, results show that pandemic period and treatment have negative impact on investment behaviour. Similarly, other firms' specific factors i.e., CIF, SGR, and FS have positive while ROA and COH have negative and significant roles in determining the corporate investment attitude.

Table 6 summarizes the interaction effect of CIF & LR with Period on corporate investment rate. The main objective behind this regression was to identify that either there any diversity in effect of pandemic Period when corporate firms have more cash inflow rate and bank loans. As the statistics reveal, the interaction terms of Period with CIF and LR have positive and significant t-stat values as 1.865 and 3.134, respectively. It further provides the robustness that more cash inflow rate and availability of bank loans can significantly reduce the adverse effects of pandemic [21]. Other variables have similar relationship as explained in Table 5.

**Table 6. Period Impact on Corporate Investment.**

Variables	Coefficient	T-statics	Probability
C	-0.049***	-1.817	0.069
Period	-0.004***	-3.069	0.001
Treatment	-0.035***	-2.826	0.004
Period*CIF	0.019**	1.865	0.056
Period*LR	0.021***	3.134	0.002
CIF	0.216***	5.088	0.000
LR	0.048	1.249	0.211
ROA	-0.319***	-3.663	0.000
SGR	0.147***	5.403	0.000
FS	0.029***	2.770	0.005
COH	-0.200***	-2.355	0.018
<b>Adjusted R-square</b>			0.093
<b>Prob. of F-stat</b>			0.000

**Note:** \*\*\* Significant at 1 %; \*\* significant at 5 %; \* significant at 10 % level **Abbreviations:** INV= investment rate, CIF=cash inflow rate, LR=liquidity ratio, FS=firm size, COH= cash holding, SGR= sales growth ratio, ROA= return on assets

Table 7 provides the statistical evidence on interaction of *Treatment* with CIF and LR and their combined effect on corporate investment behaviour. Most importantly, t-values of both interaction terms suggest the significant and positive effect on corporate investment. Their t-values are 1.611 and 2.593 that are significant at 10% and 1% level relatively. These values depict that corporate firms located in high impact areas can mitigate the adverse effect of this pandemic by boosting the cash inflow rate and enhancing their external financing. Specifically, external financing i.e., liquidity ratio has strong influence as compared to cash inflow rate. Due to pandemic, corporate firms are facing more reserve volatility [4]. Therefore, acquiring more bank loans will be more advantageous for investment and can convert the negative influence of pandemic into positive impact. It was a brief discussion on proposed research model. By summarizing, it can be suggested that the COVID-19 spread has a negative impact on industrial investment behaviour. The next section provides the conclusion of whole study.

**Table 7. Location Sensitivity and Corporate Investment**

Variables	Coefficient	T-statics	Probability
C	0.021***	5.569	0.569
Period	-0.016***	-3.310	0.006
Treatment	-0.130***	-3.453	0.000
Treatment*CIF	0.104*	1.611	0.107
Treatment*LR	0.210***	2.593	0.009
CIF	0.143***	2.267	0.023
LR	-0.101	-1.494	0.135
ROA	-0.335***	-3.856	0.000
SGR	0.150***	5.539	0.000
FS	0.029***	2.747	0.006
COH	-0.201***	-2.370	0.017
<b>Adjusted R-square</b>			0.069
<b>Prob. of F-stat</b>			0.000

**Note:** \*\*\* Significant at 1 %; \*\* significant at 5 %; \* significant at 10 % level **Abbreviations:** INV= investment rate, CIF=cash inflow rate, LR=liquidity ratio, FS=firm size, COH= cash holding, SGR= sales growth ratio, ROA= return on assets

## 5- Conclusion

The basic objective of the current study is to provide empirical evidence on COVID-19's role in determining corporate investment behaviour. According to empirical results, the first alternate hypothesis (H1) is accepted which implies that pandemic has a significant and negative impact on corporate investment behaviour. Corporate firms are facing declining investment rates due to this outbreak. The empirical analysis further reveals the significant and negative impact of period and treatment on corporate investment rate. Due to declining sales trends during pandemics, quarantine policy, and low return on capital investment, corporate firms have limited their investment volume. Additionally, the analysis states that high-impact region industries can maintain their investment rate by focusing on cash inflow rates and bank loans. Other firm-specific factors i.e., cash holding, firm size, profitability, and sales growth ratio have a dynamic role in determining the investment decision. Based upon the empirical outcomes of the current analysis, it can be suggested that corporate policy officials should develop such strategies that timely respond to unfavourable impacts of this spread. Industrial units that exist in high-impact areas should focus more on their funds' management to alienate the unfavourable impacts of this pandemic. Corporate managers should enhance their financial pace and formulate strategies that weaken the unfavourable post-pandemic impacts. At the macro level, government policy officials should develop such tax policies that uplift the depriving industrial sector. They should offer subsidies that accelerate the capital movement. Corporate managers from other developing economies can also follow the findings of this study to mitigate the unfavourable impacts of this virus.

## 6- Declarations

### 6-1- Author Contributions

U.F. has participated as conceptualization, data curation, writing and preparation of original draft while M.I.T. has contributed to conceptualization and writing-up. His contribution is also in methodology and implications. Similarly, S.A. has performed data curation, helping in revision of final draft and preparation. Lastly, M.A. has reviewed and editing the whole paper. All authors have read and agreed to the published version of the manuscript.

### 6-2- Data Availability Statement

Data that support the findings of this study were collected from annual published report by The State Bank of Pakistan (SBP) while the information on COVID-19 spread across the different regions was retrieved from COVID Information Cell established by GOP (Government of Pakistan).

### 6-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

### 6-4- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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